No. 200200147

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

University of Tennessee Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC [illegible] OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE [illegible] TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR [illegible]ING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE [illegible]URPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT [illegible]D BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ORCHARDGRASS

'Persist'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of Washington, D.C. this twentieth day of September, in the year two thousand and seven.*

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of

REPRODUCE LOCALLY. *Include form number and date on all reproductions* Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

2AD 6/7/07

1. NAME OF OWNER
University of Tennessee Research Corporation Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
TN-OG-SYN2

3. VARIETY NAME
Persist

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
1534 White Ave.
Suite 403
Knoxville, TN 37996-1527

5. TELEPHONE *(Include area code)*
865-974-1882

6. FAX *(Include area code)*
865-974-2803

PVPO NUMBER
200200147

FILING DATE
04/26/02

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
Tennessee

9. DATE OF INCORPORATION
Jan. 19, 1935

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

2AD 6/8/07

Robert J. Jondle

Jondle & Associates, P.C.
858 Happy Canyon Road
Castle Rock, CO 80108

DATA RECORD ENTRY

FILING AND EXAMINATION FEES:
$ 2705
DATE 04/26/02

CERTIFICATION FEE:
$ 768
DATE 08/22/07

11. TELEPHONE *(Include area code)*
303-799-6444

12. FAX *(Include area code)*
303-799-6898

13. E-MAIL
rjondle@jondlelaw.com

14. CROP KIND *(Common Name)*
orchard grass

15. GENUS AND SPECIES NAME OF CROP
Dactylis glomerata

16. FAMILY NAME *(Botanical)*
Poaceae

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of Variety
d. ☒ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☒ Filing and Examination Fee ($2,705), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *See Section 83(a) of the Plant Variety Protection Act)*
☐ YES *(If "yes", answer items 20 and 21 below)* ☒ NO *(If "no", go to item 22)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? ☐ YES ☐ NO
IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES?
☒ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☒ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
Ann J. Roberson			
NAME *(Please print or type)*		NAME *(Please print or type)*	
Ann J. Roberson, President, UTRC			
CAPACITY OR TITLE	DATE 4-15-02	CAPACITY OR TITLE	DATE

REPRODUCE LOCALLY. *Include form number and date on all reproductions* Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

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1. NAME OF OWNER	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME	3. VARIETY NAME
University of Tennessee Research Corporation	TN-OG-SYN2	Persist

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*	5. TELEPHONE *(Include area code)*	PVPO NUMBER
1534 White Ave. Suite 403 Knoxville, TN 37996-1527	865-974-1882	200200147
	6. FAX *(Include area code)* 865-974-2803	FILING DATE

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*	8. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. DATE OF INCORPORATION
Corporation	Tennessee	Jan. 19, 1935

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*

Robert J. Jondle
Rothwell, Figg, Ernst & Manbeck, P.C.
1425 K Street, N.W., Suite 800
Washington, D.C. 20005

FEES RECEIVED
FILING AND EXAMINATION FEES: $ DATE
CERTIFICATION FEE: $ DATE

11. TELEPHONE *(Include area code)*	12. FAX *(Include area code)*	13. E-MAIL	14. CROP KIND *(Common Name)*
(402) 333-1550	(402) 333-1510	rjondle@rothwellfigg.com	orchard grass

15. GENUS AND SPECIES NAME OF CROP	16. FAMILY NAME *(Botanical)*	17. IS THE VARIETY A FIRST GENERATION HYBRID?
Dactylis glomerata	Poaceae	☐ YES ☒ NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

- a. ☒ Exhibit A. Origin and Breeding History of the Variety
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(If additional explanation is necessary, please use the space indicated on the reverse.)

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☒ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☒ NO
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The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER	SIGNATURE OF OWNER
Ann J. Roberson	
NAME *(Please print or type)* Ann J. Roberson, President, UTRC	NAME *(Please print or type)*
CAPACITY OR TITLE	DATE 4-15-02
CAPACITY OR TITLE	DATE

INSTRUCTIONS

20020147

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $2,705 ($320 filing fee and $2,385 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

ITEM

18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

18e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.6 of the regulations for eligibility requirements.*

23. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

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21. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

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22. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Deposited with the National Seed Storage Laboratory in Fort Collins, Colorado, on April 16, 200
Not available to public

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23. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

NOTE: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089. http://www.ams.usda.gov/lsg/seed/ls-sd.htm

200200147

RAD phone 6/18/10

Exhibit A: Breeding History

The origin of TN-OG-SYN2 (experimental designation of 'Persist') dates to a collection made from 1959 to 1961 from six-year-old or older strands of orchardgrass throughout Tennessee (Fribourg and Burns, 1961). It is a six clone synthetic developed by the standard (polycross) synthetic breeding procedure for self incompatible outcrossing species. Seeds were collected from 97 ecotypes (strains) in 45 counties. None of plants from which seeds were collected can be traced back to any known public or commercial variety. The seed was used to establish single, solid-seeded rows 20 feet long and 3 feet apart. Each strain was replicated twice at the Knoxville, Plateau (Crossville) and West Tennessee (Jackson) Experiment Stations (Gray and Fribourg, 1966). After the first year establishment, plants were subjected to a severe treatment of clipping or grazing to a height of about 1 inch, three or four times during the spring and summer for four years. No fertilizer was applied to the plots during this period. Individual surviving plants were selected from each of the three locations and multiplied.

Individual plants (2100) that make up the clones constituting TN-OG-SYN2 were dug from the planting at Jackson in 1965 and transplanted in March 1966 at Jackson. Additional clipping stress was applied to these plants and 500 were selected for further advancement in 1970. Further selections and observations resulted in 72 superior clones being selected in 1973. These were dug and transferred to Knoxville. They were replicated so that there were 10 of each clone. They were transplanted in the field in April 1974. From this planting, of nine replications of each of 72 Jackson clones, 45 plants were positively identified. These comprised 42 clones (there were duplicates of 3 clones).

Ten replications of each of the 45 plants were established in a crossing block at Knoxville in 1976 and 1977. Notes were taken for maturity (flowering date), vigor and incidence of disease (primarily leaf rust) and data were collected for seed yield on an individual plant basis. Seed was bulked within each clone and used to establish progeny tests at Jackson and Knoxville. These observations and data collection were conducted between 1978 and 1983. Based on observations noted above and performance of both parents and progeny, the six most outstanding clones that were synchronous in flowering date were chosen for TN-OG-SYN2. The clone and original identification numbers are as follows. See also Table 8 in Exhibit D.

Clone No.	Ident. No.
1	12-41(8305)
2	6-92(6703)
3	20-76(3103)
4	18-30(2512)
5	3-09(1002)
6	5-62(4402)

The six clones were replicated 100-fold and established in a crossing block (randomized complete block design) in 1984 at Knoxville. Seeds were harvested on an individual plant basis and equal amounts per clone were bulked to establish an S_1 generation. S_2 seed was used to establish dry matter yield trials at the West Tennessee, Highland Rim and Knoxville Experiment Stations. Seed was also sent to the University of Kentucky to be included in dry matter yield

trials at Lexington and Princeton, KY, and to International Seeds (now Cebeco) in Halsey OR for forage and seed yield testing. S_2 seed was used to establish an S_2 generation at Knoxville and a grazing experiment at Ames Plantation.

The cultivar is uniform and stable through the S_2 and S_3 generations.

TN-OG-SYN2 has been observed for approximately three generations of increase and is stable and uniform. Variants have not been observed in TN-OG-SYN2. However, Orchardgrass, as is the case with many grasses , is self incompatible and an obligate outcrossing species. Therefore, there is much heterogeneity. In fact, each seed from a plant, even within an inflorescence, is of a different genotype. Persist is a six clone synthetic and individual plants would be expected to have some differences from each other. This type of variation occurs in most, if not all, orchardgrass cultivars and is characteristic of the species. These variants are commercially acceptable and predictable.

References

Caetano-Anollés, G., B.J. Bassam and P.M. Gresshoff (1991) DNA amplification fingerprinting using very short arbitrary oligonucleotide primers. Bio/Technology 9:553-557.

Fribourg, H.A. and J.D. Burns (1961) New orchardgrass from old strains? Tennessee Farm and Home Science Progress Report No. 40.

Gray, E. and H.A. Fribourg (1966) Progress Report: Tennessee Orchard Grass Strains Evaluation. Tennessee Farm and Home Science Progress Report No. 60, pp. 15-18.

Waller, J.C., H.A. Fribourg, C. Dixon, A.E. Fisher and B.V. Conger (2001) Orchardgrass pastures for early-weaned beef calves. p. 839-840. In: Proc. XIX Intern. Grassland Cong. 11-21 February 2001, Sao Pedro, Brazil.

Table 8 Clonal designations of 45 plants established in a crossing block in 1976 and 1977.

New Entry No.	Old Entry No.	Identification	Plant No. Used
1	3	9-38 (6805)*	3371
2	5	2-86 (5301)	8662
3	7	12-41 (8305)**1	5351
4	11	15-36 (0606)	6232
5	15	10-02(6702)*	6220
6	16	6-92 (6703)**2	2229
7	17	4-46 (8201)	9222
8	18	14-20 (1201)	5472
9	19	19-38 (2504)	2354
10	20	14-18 (1201)	7456
11	21	13-38 (4102)*	5470
12	22	3-52 (4102)*	6354
13	23	12-28 (9613)	6351
14	25	9-39 (6805)*	8551
15	26	20-48 (9604)	6352
16	32	2-15 (0902)	7571
17	33	13-68 (8506)	9771
18	34	20-76 (3103)**3	9772
19	35	8-56 (8202)	9662
20	36	21-86 (0901)	8446
21	39	18-30 (2512)**4	4235
22	41	11-72 (8305)	5354
23	42	16-100 (3102)	6471
24	44	6-58 (1811)	6116
25	45	2-28 (2511)	7114
26	46	17-47 (2505)	6235
27	47	12-10 (0902)	7113
28	48	11-38 (2901)	2248
29	50	14-42 (5801)	6472
30	51	11-34 (5812)	5117
31	52	8-08 (4407)	5350
32	53	5-03 (6705)	5114
33	54	10-94 (0072)	6222
34	58	2-59 (0301)	9109
35	60	4-36 (3401)	5118
36	61	3-09 (1002)**5	9767
37	62	5-62 (4402)**6	5471
38	63	2-69 (3102)	5234
39	64	19-70 (6702)*	9442
40	65	12-57 (7701)	7227
41	71	TE 2503 (J)	6230
42	72	Bar 1	9552
43	57	21-91 (0901)	9434
44	1	21-39 (0014)	9326
45	37	2-31 (2511)	8112

*Duplicate clones ** Clones that make up Persist

Exhibit B – Statement of Distinctness

Orchardgrass 'Persist' is most similar to orchardgrass 'Benchmark'. Orchardgrass 'Persist' differs from Benchmark in that the lemma and lemma keel hairs of 'Persist' are heavily pubescent while the lemma and lemma keel hairs of 'Benchmark' are pubescent.

In addition, 'Persist' has longer lemma awns (long versus average) than 'Benchmark' (please see Fig. 2 for comparison of lemma awn lengths).

'Persist' is most similar to 'Benchmark', however 'Persist' can be differentiated from 'Benchmark' by using DNA Fingerprinting. Using a 100 bp DNA ladder and the eight nucleotide primer 'AACGGGG', 'Benchmark' lacks the 0.9 kb and 0.7 kb bands that are present in 'Persist'.

Fig. 2. Seeds of Persist (top) and Benchmark (bottom). Note the generally longer length of lemma awns and greater pubescence of the Persist seeds.

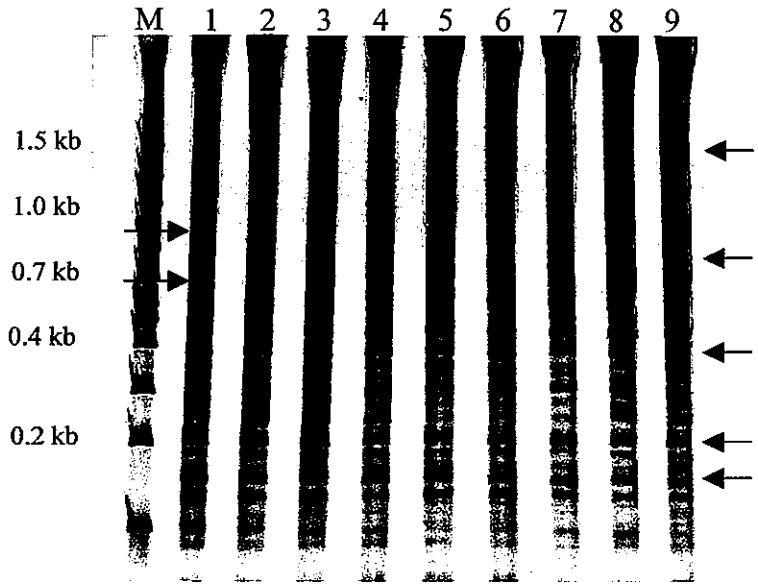

Fig. 3. DNA fingerprints of Persist (S_2 generation) plants and eight other orchardgrass cultivars using the 8-nucleotide primer 'AACGGGTG'. Lane M, 100 bp DNA ladder (molecular weight marker); Lane 1, Persist; Lane2, Benchmark; Lane 3, Potomac; Lane 4, Pennlate; Lane 5, Takena; Lane 6, Haymate; Lane 7, Duke; Lane 8, Hallmark; Lane 9, Warrior. Arrows in figure on the left indicate two unique bands in Persist. The arrows on the right indicate some bands common to all of the cultivars.

FORM GR-470-40 (7-77)

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
BELTSVILLE, MARYLAND 20705

FORM APPROVED: OMB NO. 40-R3712

OBJECTIVE DESCRIPTION OF VARIETY
ORCHARDGRASS
(Dactylis glomerata L.)

NAME OF APPLICANT(S)	VARIETY NAME OR TEMPORARY DESIGNATION
University of Tennessee Research Corporation	Persist
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code)	FOR OFFICIAL USE ONLY
1534 White Ave., Suite 403, Knoxville, TN 37996-1527	PVPO NUMBER 20200147

Place the appropriate number that describes the varietal character of this variety in the boxes below. Fill unused columns with zeroes (e.g. [0][9][9] when number is 99). In comparisons to Potomac (standard variety) be sure to strike out the comparative term which does not apply [e.g. (~~shorter~~) (longer)]; the value [0][0] should only be used to indicate that the varieties are equal. The symbol ▲ indicates a decimal point. Characteristics described, including numerical measurements, should represent those which are TYPICAL for the variety. Measured data should be for SPACED PLANTS. Any recognized color fan, e.g. Royal Horticultural Colour Chart, may be used to determine plant colors; designate system used: Royal Hort. Colour Chart; give location of test area: Knoxville, TN. Ranges of values are valuable and may be included with additional description elsewhere in the application.

~~Comparisons made to Benchmark not Potomac~~

NOTE: FOR SINGLE PLANT DATA A MINIMUM OF 100 PLANTS IS SUGGESTED.

1. PLOIDY:

[2] 1 = DIPLOID (2N = 14) 2 = TETRAPLOID (2N = 28) 3 = OTHER (Specify) _____

2. ADAPTATION (for forage or pasture):

3,5,6 1 = NORTHEAST 2 = EAST CENTRAL 3 = SOUTHEAST 4 = NORTH CENTRAL
5 = SOUTH CENTRAL 6 = PACIFIC NW. 7 = SOUTHWEST 8 = OTHER (Specify) _____

3. WINTER HARDINESS:

[4] 3 = TENDER (HALLMARK) 5 = INTERMEDIATE (PENNLATE) 7 = HARDY (CHINOOK)

4. MATURITY:

[2] SEASON: 1 = VERY EARLY (BOONE) 2 = EARLY (STERLING) 3 = MIDSEASON (PENNMEAD)
4 = LATE (PENNLATE) 5 = VERY LATE (MASSHARDY)

FLOWERING DATE (50% BLOOM) COMPARED TO ~~POTOMAC~~ Benchmark . . . [0][0] DAYS (EARLIER) (LATER)

BEGINNING OF SPRING GROWTH COMPARED TO ~~Potomac~~ Benchmark . . [0][0] DAYS (EARLIER) (LATER)

5. PLANT HEIGHT (From soil level to top of panicle):

[1][2][0] CM. TALL; COMPARED TO ~~POTOMAC~~ Benchmark . . . [0][2] CM. (SHORTER) (TALLER)

6. PLANT GROWTH TYPE (at maturity):

[3] TYPE: 1 = PROSTRATE (S-143) 2 = INTERMEDIATE (PENNMEAD) 3 = ERECT (BOONE)

PLANT WIDTH: DIAMETER ACROSS 2ND YEAR PLANT (TO TIPS OF OPPOSITE PANICLES). USE SAME OR COMPARABLE PLANTS AS FOR PLANT HEIGHT.

[0][7][0] CM. PLANT WIDTH; COMPARED TO ~~POTOMAC~~ Benchmark [0][2] CM. (NARROWER) (WIDER)

[1] EARLY LEAFINESS:
1 = PANICLE TILLERS EXSERTED BEFORE BARREN TILLERS 2 = PANICLE AND BARREN TILLERS EXSERTED TOGETHER

[1][2][0] NO. PANICLE TILLERS AT MATURITY

[ ][ ][0] NO. BARREN TILLERS AT MATURITY

LEAF ELEVATION DATA: (USE SAME OR COMPARABLE PLANTS FOR BOTH CHARACTERS)

[2][.5] CM. LENGTH OF 5TH INTERNODE BELOW PANICLE (USUALLY 1ST NONCONTRACTED INTERNODE)

[9][4] CM. TOTAL STRAW LENGTH (TO LOWEST BRANCH OF PANICLE)

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FORM GR-470-40 (PAGE 2)

7. LEAF:

1 CULM LEAF ATTITUDE (AT EARLY BOOT): 1 = ERECT (ORBIT) 2 = DROOPING (POTOMAC)

4 LEAF COLOR: 1 = YELLOW GREEN (LATAR) 2 = GREEN (STERLING) 3 = DARK GREEN (POTOMAC) 4 = BLUE GREEN (SUMAS)

Royal Horticultural Colour Chart No.000861 Saliva leucantha (foliage) Not an exact match, but closest of the color charts.

LEAF HAIRINESS (% PLANTS WITH EACH SURFACE):

100 % GLABROUS ___ % SLIGHTLY PUBESCENT ___ % PUBESCENT

1 08 MM. WIDTH (FIRST LEAF BLADE BELOW FLAG LEAF); COMPARED TO ~~POTOMAC~~ Benchmark . . . 0.2 MM. (NARROWER) (WIDER)

453 MM. LENGTH (FIRST LEAF BLADE BELOW FLAG LEAF); COMPARED TO ~~POTOMAC~~ Benchmark 10 MM. (SHORTER) (LONGER)

8. PANICLE: (from lowest panicle branch to tip of rachis):

26 CM. PANICLE LENGTH; COMPARED TO ~~POTOMAC~~ Benchmark . . . . . 04 CM. (SHORTER) (LONGER)

06 NO. PRIMARY BRANCHES 35 NO. SPIKELETS OF LOWEST GLOMERULE (SPIKELET CLUSTER)

3 CAST (SECONDARY COLOR) OF PANICLE: 1 = YELLOWISH 2 = BROWN 3 = PURPLE 4 = OTHER (Specify) _____

PANICLE TYPE: IN THE TABLE BELOW GIVE PERCENTAGE OF PLANTS WITH EACH PANICLE TYPE. PANICLE TYPE IS DETERMINED BY THE ANGLES FROM THE VERTICAL FORMED BY (A) THE RACHIS TIP AND (B) THE LOWEST BRANCH.

(B) ANGLE OF LOWEST BRANCH (FROM VERTICAL)	(A) ANGLE OF RACHIS TIP (FROM VERTICAL) 0° (ERECT)	< 45°	> 45°
(< 30°)	20%		
(30° – 90°)	80%		
(> 90°)			

9. LEMMA (first spikelet of lowest cluster):

LEMMA HAIRINESS (% PLANTS WITH EACH SURFACE):

___ % GLABROUS 100 % PUBESCENT

Note: Lemmas and lemma keels are noticably more pubescent than those of Benchmark and awns are longer.

LEMMA KEEL HAIRINESS (% PLANTS WITH EACH SURFACE):

___ % GLABROUS 100 % CILIATE

___ % PLANTS WITH NOTCHED LEMMA APEX ___ MM. DEPTH APICAL NOTCH

100 % PLANTS WITH LEMMA AWNS 150 MM. TYPICAL AWN LENGTH

10. SEED:

100 MM. WIDTH; COMPARED TO ~~POTOMAC~~ Benchmark . . . . . 00 MM. (NARROWER) (WIDER)

550 MM. LENGTH; COMPARED TO ~~POTOMAC~~ Benchmark . . . . . 40 MM. (SHORTER) (LONGER)

131 MG. PER 1,000 PURE SEED; COMPARED TO ~~POTOMAC~~ Benchmark . . 04 MG. (LIGHTER) (HEAVIER)

11. DISEASE AND INSECT RESISTANCE (rate resistance 0–9, Where 0 = not tested, 1 = 100% susceptible, and 9 = 100% resistant):

0 POWDERY MILDEW (ERYSIPHE GRAMINIS)

0 ANTHRACNOSE (COLLETOTRICHUM GRAMINICOLA)

0 OTHER (Specify) _____

0 STRIPE SMUT (USTILAGO STRIIFORMIS)

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FORM 3R-470-40 (PAGE 3)

11. DISEASE AND INSECT RESISTANCE (Continued)

RUST AND LEAF SPOT: SPECIFY AS COMPLETELY AS POSSIBLE INCLUDING SPECIES AND RACES WHERE KNOWN. IF GENERALIZED RESISTANCE OR SUSCEPTIBILITY IS CLAIMED (FIRST BOX), INCLUDE OR APPEND EXPLANATION. (0 = NOT TESTED, 1–9 = 100% SUSCEPTIBLE TO 100% RESISTANT, RESPECTIVELY.

		COMMENTS:
	RUST	
	STEM RUST (PUCCINIA GRAMINIS)	
	CROWN RUST (P. CORONATA)	
4.8	LEAF RUST (P. RUBIGO-VERA) Table 6.	Equal to or superior to Benchmark and Potomac
	STRIPE RUST (P. GLUMARUM)	
	LEAF SPOT	COMMENTS:
	LEAF STREAK (SCOLECOTRICHUM GRAMINIS)	
	LEAF BLOTCH (STAGONOSPORA ARENARIA)	
	PURPLE LEAF SPOT (STAGONOSPORA MACULATA)	
4.3	SCALD (RHYNCHOSPORIUM ORTHOSPORIUM) Table 6	Equal to or superior to Benchmark and Potomac
	LEAF SPOT (ASCOCHYTA GRAMINICOLA)	
	LEAF SPOT (MASTIGOSPORIUM RUBICOSUM)	
	LEAF SPOT (HELMINTHOSPORIUM SPP.)	
	LEAF SPOT (SEPTORIA SPP.)	
	OTHER	

12. INDICATE THE VARIETY THAT MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
LEAFINESS	Potomac	SEEDLING VIGOR	Benchmark
WINTER HARDINESS	Benchmark	SEED SIZE	Not known
FROST RESISTANCE	~~Potomac~~	% LIGNIN	Not Known
SUMMER DORMANCY	1 see below	PERSISTENCE	3 see below
HEAT TOLERANCE	2 see below	TILLERING	Benchmark

REFERENCES:

R. G. STAPLEDON, COCKSFOOT GRASS (DACTYLIS GLOMERATA L.) ECOTYPES IN RELATION TO THE BIOTIC FACTORS. JOURNAL OF ECOLOGY 16:71–104 1928.

P.F. PARKER, GENETIC VARIATION IN DIPLOID DACTYLIS III PANICLE, SPIKELET AND FLORET CHARACTERS. HEREDITY 24:383–405 1969.

COMMENTS:

Benchmark rather than Potomac was used as the reference cultivar.

1 Produces more growth than other known cultivars

2 More heat tolerant than other known cultivars

3 More persistent than other known cultivars

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Exhibit C: Botanical Description

Persist is typical of other orchardgrasses used for pasture and /or hay. It is a cool-season (C_3) grass that has a "bunch type" growth habit and makes most of its growth in early spring. Its leaves are flattened with united edges and folded into each other. They appear V-shaped in cross section. The leaf collar is divided and glabrous, the ligule is membranous and 2-8 mm long, and auricles are absent. Leaf blades are 6-10 mm wide and 15-25 cm long.

Flowering culms are 1.0-1.3 m in length and have 2-4 nodes. The inflorescences are 8-15 cm long and the spikelets are very compact within panicles. The spikelets contain 2-5 florets each. The lowermost branches of panicles are longer and have more branching than those near the top. Reproduction is sexually by seed formation and asexually by tiller formation. It has a fibrous root system ant there are no rhizomes or stolons. Tillering continues throughout the growing season. Therefore, nonuniformity for stage of maturity exists throughout the vegetative and flowering stages. The root system is fibrous.

Compared to Benchmark, Persist may be slightly more bluish-green. Persist has equal or better tolerance to rust and scald. In dry matter yield trials, it has produced more forage than Benchmark and produced more seed in seed production trials.

Fig. 1. Persist orchardgrass pasture (top) and Persist orchardgrass plants in pasture at Ames Plantation, TN, 12 October 2001 (5 years after establishment).

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Exhibit D – Data Tables and Comparison to Benchmark

Table 1. Dry matter yields (lb/A) of orchardgrass cultivars grown at Knoxville, TN from 1990-1994.

Table 2. Dry matter yields (T/A) and maturity ratings of orchardgrass varieties sown 15 September 1992 at Lexington, KY.

Table 3. Dry matter yields (T/A) and maturity ratings of orchardgrass varieties sown 16 September 1992 at Princeton, KY.

Table 4. Available forage (kg $ha^{-1}d^{-1}$) and least squares means (±SEW) of early- and normal-weaned steer calves and their dams during three Spring grazing seasons at Ames Plantation, TN.

Table 5. Observations on persistence of orchardgrass pastures at Ames Plantation, TN, 1997-2000.

Table 6. Forage yields (fresh wt. T/A) and disease ratings (rust and scald) of orchardgrass varieties grown near Tangent, OR, 1996-1998.

Table 7. Seed yields and maturity ratings of orchardgrass varieties grown near Tangent, OR, 1997-1998.

Table 8. Clonal designation of 45 orchardgrass plants established in a crossing block in 1976 and 1977.

TN-OG-SYN2 is most similar to Benchmark. However, TN-OG-SYN-2 is distinct in the following ways:

1) TN-OG-SYN-2 consistently produces more forage later in the season.

a) Dry matter yield data, by individual cutting date, obtained at Knoxville, Tennessee, for 5 years (1990-1994) are presented in Table I. The variety test included TN-OG-SYN-2 and six commercially grown cultivars.

b) Dry matter yield data obtained at Lexington and Princeton, Kentucky are presented in Tables 2 and 3. These trials included 22 entries of commercial varieties and experimental breeding lines. TN-OG-SYN-2 produced the top yield over the two years at both locations.

c) Dry matter yield data obtained at the Ames Plantation in Southwest Tennessee are presented in Table 4. The data show that TN-OG-SYN-2 produced significantly more forage than Benchmark, with and without clovers.

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Exhibit D – Continued

2) TN-OG-SYN-2 has improved persistence and productivity over long periods compared to Benchmark and other orchard grass cultivars.

a) TN-OG-SYN-2 produced the highest yields during the last two years of a five year variety trial in Knoxville, Kentucky (Table 1).

b) Grazing experiments were established at the Ames Plantation, Tennessee, in 1996, consisting of TN-OG-SYN-2 and Benchmark, with and without clover. Early-weaned Fall-born calves were allowed to graze the pastures. (Table 4) The grazing period was from approximately April 1 through June 30, and was conducted for four years. In 1999 additional grazing pressure was applied to the pastures by larger animals after the steer calves were removed in late June. Additional stress occurred because of severe drought conditions during the Spring and Summer of 1999.

Visual ratings of the pastures showed that TN-OG-SYN-2 maintained much higher persistence than Benchmark, especially in pure stand (Table 5). By September 2000 the stands in the two Benchmark pastures without clover had deteriorated to the point where they were nearly gone (0-10%), however, the two pastures with TN-OGSYN-2 without clover retained stands of about 70-80%.

3) "Persist" has a slightly more bluish color in pastures than Benchmark. Please see included photo.

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Table 1 Dry matter yields in lbs/A of orchardgrass cultivars grown at Knoxville, TN from 1990-1994.

1990 Harvest dates

Cultivar	5-Apr	15-May	13-Jun	18-Jul	24-Aug	15-Nov	Total
TN-OG-SYN-2	1782	1481	617	353	1132	1311	6676
Potomac	1776	1326	609	339	957	1070	6077
Rancho	1630	1577	604	435	882	793	5921
Ambassador	1799	1456	616	384	1101	999	6354
Shiloh	1824	1354	652	386	1106	1187	6509
Benchmark	1747	1417	581	404	982	1172	6304
Green's Exp.	1639	1480	564	348	854	1018	6003
Mean	1742	1442	606	378	1016	1079	6263
CV, %	4.4	5.9	4.6	9.1	9.4	15.4	4.4
SE	29.2	32.1	10.6	13.0	36.3	62.9	104.7

1991 Harvest dates

Cultivar	18-Apr	21-May	28-Jun	23-Aug	24-Sep	Total
TN-OG-SYN-2	1934	923	1985	420	733	5995
Potomac	1858	779	1706	235	607	5184
Rancho	1842	947	1882	183	644	5497
Ambassador	2013	792	1852	179	618	6456
Shiloh	2049	850	1982	219	659	5755
Benchmark	1896	903	1884	282	629	5594
Green's Exp	1575	906	1533	153	717	4884
Mean	1881	871	1832	239	658	5481
CV,%	8.2	7.5	8.8	37.9	7.4	6.7
SE	58.6	24.8	61.1	34.2	18.5	137.8

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Table 1 continued

1992 Harvest dates

Cultivar	23-Apr	26-May	11-Sep	Total
TN-OG-SYN-2	1888	857	2706	5451
Potomac	1672	770	2561	5003
Rancho	1373	1024	2797	5195
Ambassador	1802	895	2887	5584
Shiloh	1823	680	2627	5130
Benchmark	2017	688	2499	5204
Green's Exp	1683	851	2644	5177
Mean	1751	824	2674	5249
CV,%	11.7	14.8	5.0	3.8
SE	77.3	46.0	50.7	75.3

1993 Harvest dates

Cultivar	30-Apr	26-May	10-Sep	12-Nov	Total
TN-OG-SYN-2	1553	528	3459	1206	6746
Potomac	1467	521	3257	1080	6325
Rancho	1022	1150	2990	1176	6338
Ambassador	1521	502	2173	890	5086
Shiloh	1436	547	2876	1090	5749
Benchmark	1851	400	2816	1174	6241
Green's Exp.	1232	868	2724	1337	6161
Mean	1440	645	2871	1136	6092
CV,%	18.1	41.2	14.6	12.1	8.7
SE	98.4	100.5	158.8	52.1	201.1

Table 1 continued

1994 Harvest dates

Cultivar	13-May	25-Aug	13-Dec	Total
TN-OG-SYN-2	4160	1602	496	6258
Potomac	3375	2087	434	5896
Rancho	2692	1665	431	4788
Ambassador	3550	1505	304	5359
Shiloh	3586	1509	412	5557
Benchmark	4065	1413	267	5745
Green's Exp.	2819	1693	573	5085
Mean	3464	1635	417	5528
CV,%	16.2	14.8	25.2	9.0
SE	212.0	98.5	39.7	188.1

Five Year Summary

Cultivar	1990	1991	1992	1993	1994	Average
TN-OG-SYN-2	6676	5995	5451	6746	6258	6225
Potomac	6077	5185	5003	6325	5896	5697
Rancho	5921	5497	5195	6338	4788	5548
Ambassador	6355	5456	5584	5086	5359	5568
Shiloh	6509	5755	5130	5749	5557	5740
Benchmark	6304	5594	5204	6241	5745	5818
Green's Exp.	6003	4884	5178	6161	5085	5462
Mean	6264	5481	5249	6092	5526	5723
CV,%	4.4	6.6	3.8	8.7	9.0	4.4
SE	104.7	137.8	75.2	201.1	188.3	85.7

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Table 2 DRY MATTER YIELDS (TONS/ACRE) OF ORCHARDGRASS VARIETIES SOWN 15 SEP 1992 AT LEXINGTON, KENTUCKY.

	MATURITY	1993	1994 HARVESTS			1994	2-YR
VARIETY	MAY09 94	TOTAL	MAY10	JUN03	OCT24	TOTAL	TOTAL
BOONE	10.00**	3.60	1.30	0.47*	0.76	2.53	6.13
CIS-EG1	10.00**	3.84	1.61**	0.50*	0.90	3.01*	6.85
CIS-2B	10.00**	3.67	1.29	0.30	0.83	2.41	6.08
BENCHMARK	9.75*	4.74**	1.50*	0.49*	0.94	2.93*	7.67*
KYEXP3	9.75*	4.37*	1.58*	0.59*	1.00	3.17*	7.54*
POTOMAC	9.75*	4.29*	1.39	0.47*	0.87	2.73	7.01*
SHILOH	9.75*	4.38*	1.39	0.46*	0.91	2.75	7.14*
→ TN-OG-SYN-1	9.67*	4.65*	1.55*	0.48*	1.18**	3.21**	7.86**
PAIUTE	9.50*	4.18	1.37	0.47*	0.86	2.70	6.88
HHR-2	9.25*	4.22	1.46*	0.45*	0.83	2.74	6.96
LATAR	9.25*	4.29*	1.20	0.46*	0.89	2.55	6.84
CIS-LG4	9.00*	3.48	1.13	0.27	0.92	2.32	5.79
KYEXP1	9.00*	4.35*	1.39	0.57*	0.86	2.81*	7.16*
KYEXP2	9.00*	4.63*	1.39	0.60**	0.91	2.90*	7.53*
OG90132	9.00*	4.40*	1.33	0.50*	0.99	2.83*	7.23*
ELSIE	8.75	3.90	1.29	0.36	0.84	2.50	6.39
SHAWNEE	8.50	3.74	1.15	0.55*	0.97	2.67	6.41
WARRIOR	8.50	4.45*	1.25	0.50*	0.94	2.69	7.15*
CONDOR	8.33	4.61*	1.32	0.53*	0.93	2.78*	7.39*
D58	7.75	3.80	1.07	0.56*	0.89	2.52	6.31
89-103	7.67	4.53*	1.31	0.51*	1.05*	2.86*	7.40*
DAWN	7.50	3.89	1.27	0.52*	0.84	2.63	6.51
MEAN	9.08	4.17	1.35	0.48	0.91	2.75	6.91
CV, %	9.27	8.22	14.19	20.22	11.47	11.75	8.86
LSD, 0.05	1.19	0.49	0.19	0.14	0.15	0.45	0.87

MATURITY RATING SCALE:

1=VEGETATIVE	11=FULL HEAD
3=EARLY BOOT	13=EARLY BLOOM
5=MID BOOT	15=FULL BLOOM
7=LATE BOOT	17=SEED (DOUGH)
9=EARLY HEAD	19=MATURE SEED

1993 TOTAL INCLUDES 4 HARVESTS DATED MAY06, JUN07, JUL13, AND OCT28.

**HIGHEST NUMERICAL VALUE IN THE COLUMN.

*NOT SIGNIFICANTLY DIFFERENT FROM THE HIGHEST NUMERICAL VALUE IN THE COLUMN BASED ON THE 5% LSD.

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Table 3 DRY MATTER YIELDS (TONS/ACRE) AND MATURITY RATINGS OF ORCHARDGRASS VARIETIES SOWN 16 SEP 1992 AT PRINCETON, KENTUCKY.

	MATURITY	1993	1994 HARVESTS					1994	2-YR
VARIETY	MAY02 94	TOTAL	MAY02	JUN02	JUN30	AUG03	OCT27	TOTAL	TOTAL
BENCHMARK	10.00**	3.50*	1.65*	0.59	0.20*	0.15*	0.42	3.03*	6.52*
SHILOH	9.50*	3.29*	1.45*	0.73*	0.18*	0.19**	0.47	3.02*	6.31*
TN-OG-SYN-2	9.25*	3.52*	1.67**	0.59	0.21*	0.16*	0.62**	3.26**	6.78**
BOONE	9.00*	3.09*	1.45*	0.71*	0.19*	0.12*	0.43	2.90*	6.00*
CIS-2B	9.00*	2.70	0.90	0.50	0.21*	0.17*	0.45	2.23	4.93
PAIUTE	8.75*	2.95	1.35	0.50	0.14	0.07	0.25	2.32	5.27
KYEXP3	8.50*	3.61*	1.52*	0.68*	0.19*	0.13*	0.58*	3.11*	6.72*
CIS-EG1	8.25*	2.97	1.38	0.69*	0.21*	0.17*	0.38	2.83*	5.79*
POTOMAC	8.25*	3.05	1.36	0.68*	0.16*	0.16*	0.44	2.81*	5.86*
LATAR	8.00*	3.69*	1.21	0.69*	0.20*	0.12*	0.36	2.59	6.28*
HHR-2	7.50	3.38*	1.34	0.64	0.19*	0.15*	0.35	2.67	6.05*
KYEXP2	7.50	3.69*	1.42*	0.73*	0.20*	0.17*	0.54*	3.06*	6.75*
CIS-LG4	5.50	3.04	0.93	0.58	0.15	0.15*	0.39	2.20	5.23
CONDOR	5.50	3.42*	1.21	0.66	0.17*	0.14*	0.41	2.60	6.01*
DAWN	5.50	3.44*	1.14	0.74*	0.20*	0.15*	0.40	2.62	6.07*
ELSIE	5.50	3.44*	1.13	0.67*	0.17*	0.17*	0.45	2.60	6.04*
WARRIOR	5.50	3.79**	1.05	0.64	0.15	0.12*	0.43	2.39	6.19*
KYEXP1	5.00	3.54*	1.23	0.77*	0.18*	0.12*	0.59*	2.89*	6.43*
90132	5.00	3.51*	1.16	0.77*	0.23**	0.18*	0.43	2.76	6.28*
058	4.00	2.74	1.07	0.79**	0.13	0.15*	0.41	2.56	5.30
SHAWNEE	4.00	3.34*	0.86	0.72*	0.14	0.16*	0.28	2.16	5.50*
89-103	3.50	3.31*	1.01	0.79**	0.16*	0.08	0.37	2.41	5.72*
MEAN	6.93	3.32	1.25	0.68	0.18	0.14	0.43	2.68	6.00
CV, %	22.57	15.12	15.37	13.69	29.95	41.64	23.52	12.16	11.61
LSD, 0.05	2.21	0.71	0.27	0.13	0.08	0.09	0.14	0.46	0.98

MATURITY RATING SCALE:

1=VEGETATIVE	11=FULL HEAD
3=EARLY BOOT	13=EARLY BLOOM
5=MID BOOT	15=FULL BLOOM
7=LATE BOOT	17=SEED (DOUGH)
9=EARLY HEAD	19=MATURE SEED

1993 TOTAL INCLUDES 4 HARVESTS DATED MAY12, JUN10, JUL15, AND OCT26.

**HIGHEST NUMERICAL VALUE IN THE COLUMN.

*NOT SIGNIFICANTLY DIFFERENT FROM THE HIGHEST NUMERICAL VALUE IN THE COLUMN BASED ON THE 5% LSD.

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Table 4 Least squares means [†] (±SEM) of early- and normal-weaned steer calves and their dams during three spring grazing seasons.

	Units	Early weaning pastures				Normal weaning (control)
		Syn 2	Syn 2 + clovers	Benchmark	Benchmark + clovers	
Available forage	kg ha^{-1} d^{-1}	44.6 ± 5.1^{b}	50.4 ± 5.1^{c}	37.6 ± 5.1^{a}	43.8 ± 5.1^{b}	—
Initial calf weight	kg	143 ± 6.4	144 ± 6.6	144 ± 6.4	145 ± 6.6	144 ± 5.1
Final calf weight	kg	198 ± 6.4^{a}	222 ± 6.6^{b}	199 ± 6.4^{a}	218 ± 6.6^{b}	247 ± 5.1^{c}
Gain (ADG)	g d^{-1}	637 ± 50^{a}	928 ± 51^{b}	641 ± 50^{a}	855 ± 51^{b}	1151 ± 47^{c}

[†] Numbers within a row followed by a different letter are different at $P \leq 0.05$.

Table 5 **Observations on persistence of orchardgrass pastures at Ames Plantation, 1997-2000**

Spring 97	All pastures seeded in pure stand of orchardgrass are well established. There are no differences with regard to variety. The grass is too tall and the stands too thick to make quantitative estimates. All orchardgrass-clover mix pastures have about the same grass-clover ratio.
Spring 98	Orchardgrass-clover pastures have about a 50:50 ratio of grass-clover. Pure orchardgrass pastures appear to be equal.
Summer 99	One of the SYN-2-clover and one of the Benchmark-clover pastures have a decrease in clover to about 30%. The clover in one of the SYN-2 pastures has increased to about 60%.
Fall 99	All pastures show drought stress. Pastures with clovers appear better than those with orchardgrass in pure stand. Pastures with SYN-2 in pure stand are superior to those with Benchmark in pure stand.
Spring 00	Benchmark pastures in pure stand are thin and have little available grass. SYN-2 pastures in pure stand have a good stand of grass. Benchmark pastures with clover have a loss of grass. The grass in these pastures appear stressed and are not as green as those with SYN-2.
Fall 00	Clover has been lost in all pastures that were originally seeded with clovers. Orchardgrass stands are approximately 70-80% in SYN-2 pastures seeded without clover and 0-10% in Benchmark pastures seeded without clover.
Spring 01*	Stands of Persist in pastures seeded without clover is about 80%. The stands of Benchmark (also seeded without clover) is less than10%.

* Notes taken after approved release

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Table 6

Forage yields of orchardgrass varieties grown near Tangent, Oregon. Trial planted October 1995

Variety	Fresh wt (tons/acre) 6-1-96	Fresh wt (tons/acre) 6-29-96	Fresh wt (tons/acre) 8-1-96	Fresh wt (tons/acre) 11-4-96	Fresh wt (tons/acre) 96 Total	Fresh wt (tons/acre) 6-13-97	Fresh wt (tons/acre) 7-31-97	Fresh wt (tons/acre) 97 Total
TN-OG-SYN 2	12.3	3.8	6.3	5.2	26.6	31.6	8.1	39.7
Benchmark	12.3	3	7.2	5.1	27.5	33.4	8.9	42.3
Potomac	12.3	3.8	6.3	5	27.4	32	8.9	40.9
Ambassador	11.2	3.4	6.5	4.9	25.6	31.4	8.8	40.3
Justus	11	3.6	5.8	4.7	25.1	32.1	8.5	40.7
LSD @ 0.05	n.s.	n.s.	1.3	n.s.	n.s.	n.s	n.s.	n.s.

Variety	Fresh wt (tons/acre) April '98	Fresh wt (tons/acre) June '98	Fresh wt (tons/acre) 98 Total	Fresh wt (tons/acre) 96,'97,'98 Total	Disease (rust &scald) 1-9; 9=none Dec '98
TN-OG-SYN 2	27.9	18.2	46.1	112.4	4.33
Benchmark	30.4	18	48.4	118.2	3.7
Potomac	27.7	17.3	45	113.3	3.7
Ambassador	30.2	17	47.1	113	4
Justus	26.7	18	46.7	112.5	3.7
LSD @ 0.05	n.s.	n.s.	n.s.		n.s.

L7100202

Table 7

Seed yields of orchardgrass varieties grown near Tangent, Oregon. Trial planted October 1995

Variety	Heading Date 1997	Heading Date 1998	Seed Yield (Lbs/A) 1997	Seed Yield % Potomac 1997	Seed Yield (Lbs/A) 1998	Seed Yield % Potomac 1998	Seed Yield (Lbs/A) 97-'98 avg	Seed Yield % Potomac 97-'98 avg
TN-OG-SYN 2	May 9	May 2	352	113.5	472	118.9	412	116.4
Benchmark	May 10	May 2	344	111.0	439	110.6	392	110.7
Potomac	May 10	May 2	310	100.0	397	100.0	354	100.0
Ambassador	May 11	May 6	455	146.8	438	110.3	447	126.3
Justus	May 12	May 8	412	132.9	465	117.1	438	123.7
LSD @ 0.05			n.s		n.s.		n.s.	

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2002047

200200147

The applicant verifies that seeds of the orchardgrass cultivar Persist, which are the subject of the present application, were deposited on 16 October 2002 at the National Center for Genetic Resources Preservation (formerly the National Seed Storage Laboratory) in Fort Collins, Colorado, as PI 618722 NSSL 407827.53.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

RAD 6/18/07

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
University of Tennesse Research ~~Corporation~~ Foundation	TN-OG-SYN2	Persist

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	5. TELEPHONE *(Include area code)*	6. FAX *(Include area code)*
1534 White Ave Suite 403 Knoxville, TN 37996-1527	865-974-1882	865-974-2803

7. PVPO NUMBER 200200147

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain** [X] YES [ ] NO

9. Is the applicant (individual or company) a U.S. National or a U.S. based company? **If no, give name of country** [X] YES [ ] NO

10. Is the applicant the original owner? [ ] YES [X] NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

[ ] YES [ ] NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

[X] YES [ ] NO **If no, give name of country**

11. Additional explanation on ownership *(If needed, use the reverse for extra space)*:

The orchard grass variety, TN-OG-SYN2, was developed by employees of the applicant who were under an obligation to assign inventions or discoveries, including the orchard grass variety, TN-OG-SYN2, for which application for Plant Variety Protection Certificate is attached.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.